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INDEX

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 30, 1945



Fireworks in War

See Page 409

A SCIENCE SERVICE PUBLICATION

ASTRONOMY

Many Habitable Worlds

Life is possible on thousands of planets. Chances vastly increased by discovery of dark planetary companions of bright stars.

► LIFE may exist on thousands of habitable worlds among the millions of small dark planet companions of bright stars throughout the universe, Dr. Henry Norris Russell, Princeton University professor of astronomy, declared.

Explaining that in the sun's planetary system, life has scored twice out of three tries, Dr. Russell holds that it is reasonable to suppose that, within the vast expanse of the universe, there may be many other bodies which actually support life.

There are only three possible habitable bodies in the solar system—Venus, the earth and Mars. The fact that the maximum surface temperature on Venus is probably that of boiling water indicates to Dr. Russell that there is no life on that planet. Life has probably existed and may still exist on Mars, Dr. Russell finds.

"Outside the system composed of our sun and its circulating planets, there was no evidence for the existence of other planets till within the last three years," Dr. Russell said. "Recent precise photographic observations, however, show that several of the nearest stars have invisible companions, revolving about them, which can be detected because their attraction causes the bright stars to move in slightly wavy curves. The smallest of these companions are certainly dark bodies, and may fairly be called planets. We can find small companions of this sort only if they belong to some one of the few hundred stars which lie nearest to the sun. Among the many millions of remoter stars, there are very likely great numbers of them. Though the conditions for habitability are fairly stringent, there may well be thousands or more, of habitable worlds among them."

Life on all these possible worlds is quite unlikely to be in the same stage of evolution as it is on earth today, Dr. Russell said. On some, there may be only primitive forms, he explained. On others, there may be living creatures far surpassing mankind in intelligence and character.

"What these forms of life, high or low, may be, we have no way at all of finding out," Dr. Russell said. "The va-

riety of living things, past and present, on our planet is vast. The material possibilities of life probably outrun the human imagination. Our race has possessed intellectual and moral capacities for something like a thousandth part of the time in which life has existed on earth, and the possibilities in this field presumably transcend our present powers of thought."

Dr. Russell spoke during the intermission of a New York Philharmonic-Symphony broadcast sponsored by the U. S. Rubber Company.

Science News Letter, June 30, 1945

GEOGRAPHY

Rainfall Cycles Connected With Malaria Epidemics

► MALARIA epidemics, recurring at intervals of 10 or 12 years, very probably had a good deal to do with the decay of the ancient high civilization of the Near East, Dr. Helmut de Terra, now at Ohio State University, declares in a report

in *Science* (June 22). This recurrence of epidemics he believes is a result of a cyclic recurrence in wet years, making for an abundance of the mosquitoes that carry malaria germs. He further points out a rough correspondence between the wet years and the 11-year major sunspot period.

Several factors help to aggravate the mosquito-breeding situation in wet years, Dr. de Terra suggests. The wet years tend to come immediately after one or two exceptionally dry ones. During the dry years, weathered rock fragments and other debris tend to pile up in stream courses where there is no water to keep them washed out. Then, when the rains come, there is excessive ponding, greatly increasing the potential breeding areas.

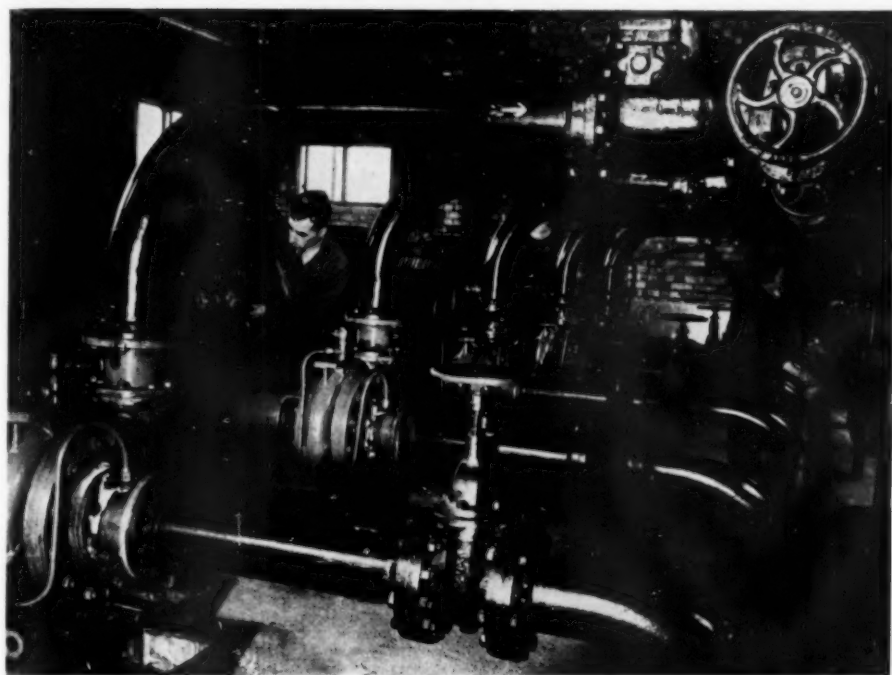
Furthermore, the "lean years" of drought are naturally years of food shortage. The wandering desert Arabs drift into the settled areas near the streams, hunting for food. So when the wet years bring their sudden great increases in the numbers of malaria-carrying mosquitoes, there are unusual numbers of human victims and malaria carriers awaiting them.

Dr. de Terra, who in normal times conducts researches on the antiquity of man in parts of Asia now overrun by the enemy, is visiting professor of geography at the Ohio State University.

Science News Letter, June 30, 1945



FOG DISPERSED—This Royal Air Force Lancaster, its outline blurred through the haze of the fires, is taking off between two bands of flame from FIDO, (Fog Investigation Dispersal Operations), as the fog is dispersed from a British airfield. FIDO provides the necessary heat on airfields to bring about fog clearance by a continuous line of burners installed on each side of the main runway.



PUMPS FOR FIDO—The Sultz pumps, six of which have an output of 80,000 gallons of fuel an hour, supply the pipes down the runways for FIDO. FIDO consists of three main portions—burner light, pumping and distribution and storage. Fog can be cleared in from six to ten minutes. For each plane landed, FIDO uses 6,000 gallons of gasoline. This fog lifting invention played a vital part in RAF Bomber Command's attacks on Von Rundstedt's troops during the critical days of the Ardennes offensive.

MEDICINE

Hope for Dengue Vaccine

Vaccination against "break-bone fever" may result from first success in giving disease to mice. Prisoners volunteer for tests showing immunity can be produced.

➤ HOPE that vaccination against dengue, or "break-bone fever," may be achieved appears in a report by Lt. Col. Albert B. Sabin and Capt. R. Walter Schlesinger, of the Army Epidemiological Board and the Children's Hospital Research Foundation. (*Science*, June 22.)

Dengue, though not fatal, is a painful, very weakening disease spread by the same mosquitoes that carry yellow fever. It has occurred in the southern part of the United States and there have been outbreaks in New Guinea and Hawaii. Because of the disability it causes through its weakening effect, it could be a problem to an army fighting in regions where it is prevalent.

Inmates of the New Jersey State Prison, who volunteered for the studies, have been given immunity to this disease by injections of dengue virus which had

been propagated in mice. The feat of establishing the virus in mice has never before been accomplished although a number of attempts have been made.

The virus becomes modified by transmission from one mouse to another, so that it causes a progressively less severe disease. The volunteers from the state prison actually got, along with their immunity to dengue, a mild attack of it. It was no more severe, the scientists report, than the reaction following typhoid vaccination and consisted of fever with or without headache and sickness for 24 hours or less. A marked, extensive rash, which is one of the symptoms of dengue, also followed the immunizing dose of the virus.

Evidence that the virus gave protection against dengue came when the volunteers failed to get the disease after being

bitten by mosquitoes carrying the virus. When four unprotected volunteers were bitten by mosquitoes from the same infected lot, they all developed typically severe unmodified dengue.

Ideally, of course, a vaccine gives protection against a disease without producing a mild attack of it and such a vaccine for dengue may yet be produced. The modification of the virus by passage through mice has already become so marked, the scientists report, that this virus "could be used as a vaccine for the production of immunity against dengue."

Science News Letter, June 30, 1945

ASTRONOMY

Protect Your Eyes When Watching July Eclipse

➤ NO ONE, of course, should ever look right at the sun with unprotected eyes, so if you want to watch the sun as it hides behind the moon early on the morning of July 9, you should find some used photographic film or smoked glass. To look at the sun directly would be running the risk of permanent damage to your eyes and possibly blindness.

Smoked glass is an old standby for solar observations. Just get a piece of glass (a large piece from a broken window-pane will do) and hold a flaming candle beneath it until one side is well coated with soot. Set it aside carefully, with the sooty side up, so that none of the coating will be brushed off before use.

Even better than a smoked glass, which has to be handled with care, is an old densely exposed and developed photographic negative. Make sure that all parts of the film are dark as even a few light spots may permit the sun's rays to reach your eyes. Your sun glasses probably are not thick enough to permit you to look directly at the sun, but welder's glasses (if you have a friend who can lend you some) are good. But don't look at the sun too long, no matter how well your eyes are protected as a few injurious rays not stopped by the glasses or film may get through.

If you have a small telescope, with a tripod, or some other firm support, it may be used. There are special solar eyepieces for telescopes, which reduce the light sufficiently to permit the observer to look right through the telescope when pointed at the sun. Still more convenient, however, and permitting several people to look at the same time, is a white screen, placed where the back of one's

head would be if looking through the telescope.

A collar, consisting of a cardboard disk with a hole cut in the center, may be placed around the telescope to shield the screen from the direct rays of the sun. Then, if the instrument is pointed at the

sun, and it is focused by pulling the eyepiece in and out, an image of the sun several inches in diameter can be seen on the screen. Perhaps even a few sunspots will be visible on the screen before the moon begins to creep across its face.

Science News Letter, June 30, 1945

INVENTION

Patents to Be Licensed

► A NEW service to American inventors and businessmen is being offered by the U. S. Patent Office. Beginning this week, a register of patents available for licensing or sale will be published in the weekly *Official Gazette* of the Patent Office, to help establish contact between manufacturers looking for good and profitable articles to make and inventors or owners of unexpired patents on such gadgets. This service is expected to be especially useful to small manufacturers.

Procedure will be of the simplest. Formalities are wiped out altogether. There are no blanks to fill out, no questionnaires to answer. All the patent owner needs to do is write an ordinary letter to the Patent Office, giving the number of the patent he owns and attaching a printed copy, and stating that he is willing to license or sell same on reasonable terms. If he doesn't happen to have a copy of his patent on hand, he can attach an order for a copy, enclosing a dime to pay for it.

If he cares to state definitely the terms on which he will license or sell, they will be included in the statement in the Register; otherwise the "reasonable terms" clause will leave him free to drive his own bargain with the licensee, either directly or through an attorney or other agent.

Likewise free of formalities are the brief abstracts prepared in the Patent Office as guides to possible licensees. The interminable, and often unintelligible, technical jargon in which patent attorneys usually couch patent claims is all tossed overboard, and the essential nature of the device offered is set forth in a score or so of words in plainest English. A sample: "Book-type toilet kit or the like with clamp inside so arranged that clamp acts as support when case is open and in use."

In publishing this register of licensable patents, the Patent Office is not assuming any responsibility to either the patent owner or the licensee. On the one hand, it does not guarantee the practicability of any invention; on the other,

it offers the patent owner no assurance of the business standing of the would-be licensee. The suggestion is offered that the owner use "methods any prudent individual might observe, such as credit reports, business ratings, etc."

The Patent Office is undertaking one further service: it is setting up classified mailing lists for businessmen interested in specific types of inventions as they are added to the new Register. Thus, if a manufacturer is interested in, say, shoes, or fountain-pens, or coffee percolators, or flashlights, he will ask to have his name placed on the appropriate mailing list. Thereafter he will receive notices of such patents as are listed in that particular category, without having to wade through a lot of descriptions about which he cares nothing.

Copies of the Register will be sent regularly to trade journals, for publication if they so desire. Even the preliminary notices that have appeared this month in only a few such publications have already resulted in something over 100 inquiries from interested manufacturers.

Science News Letter, June 30, 1945

PUBLIC HEALTH

Polio Cases Increase, But No Sign of Epidemic Yet

► INFANTILE paralysis cases have increased slightly throughout the nation and are above the total for this time last year. No signs of an epidemic have appeared yet, however.

The total number of cases reported to the U. S. Public Health Service for the week ending June 16 is 99. This is four more than for the previous week.

Most of the cases are scattered about the country except for 37 reported from Texas, the largest number from any one state. New York, with 10 cases, had the next highest number. Fear of an epidemic in Texas led to a request from health authorities there for U. S. Public Health Service aid. Their Dr. A. G. Gilliam has been sent to Houston which, on June 9, reported 10 cases with two

deaths. The state's total of 42 cases for the week of June 9, however, dropped to 37 the week of June 16, and Houston had only eight cases this past week.

Since Jan. 1 this year, 999 cases of infantile paralysis have been reported, a considerable increase over the 657 reported during the corresponding period in 1944. While this might seem alarming, health authorities point out that some of these cases represent a carry-over into the first months of the year of cases that really were part of last year's epidemic.

Science News Letter, June 30, 1945

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ASTRONOMY

Metals Float Above Gas

Mt. Wilson astronomers confirm theory that cool metallic clouds of iron, vanadium and titanium partially absorb the light from hot hydrogen.

► INCREASED light-efficiency of the 100-inch reflector, due to faster photographic plates and to optical apparatus of improved design, has enabled astronomers of the Mt. Wilson Observatory to obtain large-scale photographs of the spectra of certain red stars which confirm and extend an hypothesis advanced nearly half a century ago. The results of the investigation have been announced by Dr. Paul W. Merrill in the *Publications of the Astronomical Society of the Pacific*.

Light from most stars, when spread out into a rainbow-colored band or spectrum, is found to be crossed by a series of dark lines due to hydrogen gas in their atmospheres. The first line of the series is in the red, the second in the blue, the third in the violet, etc., the strength of the series decreasing in a regular way from red to violet.

In many red variable stars, however, the hydrogen lines, instead of being dark, are bright during a part of the cycle of luminosity of the star. A most puzzling feature is the irregular strength of the lines, the series having what Dr. Merrill describes as a "mutilated" appearance, which is without counterpart in any other type of star.

For years it has been known that the surface of these stars is covered by cool clouds of metals, such as iron, vanadium, and titanium. These clouds partially absorb the light emitted from the hot hydrogen gas below them, thus producing many of the observed irregularities in the strength of the bright lines.

Confirmatory evidence to this effect was supplied by comparing the structure of certain ultraviolet bright hydrogen lines in the spectrum of the red variable star, Omicron Ceti, with the spectrum of the red star, Beta Pegasi. The spectrum of Beta Pegasi closely resembles that of Omicron Ceti except that it lacks the bright hydrogen lines. The comparison revealed close agreement between depressions in the bright hydrogen lines in Omicron Ceti and dark lines due to metals in Beta Pegasi, conclusive evidence that the mutilated appearance of the series is due to the influence of cool metallic clouds which

must lie above the glowing hydrogen.

A mystery still unsolved is why hydrogen gas shines so brightly in red variables like Omicron Ceti which are among the coolest known stars, having a surface temperature estimated at only 4,000 degrees Fahrenheit. To make hydrogen shine requires some special source of energy supply which astronomers have not been able to identify. Dr. Merrill believes the changes in strength of the bright hydrogen lines are closely connected with the mechanism causing the variations in the brightness of the star as a whole.

Science News Letter, June 30, 1945

PSYCHOLOGY

Chimpanzees Valuable for Psychological Research

► CHIMPANZEES do not suffer from mental disease, Dr. Robert M. Yerkes of Yale University revealed.

"Among the hundreds of chimpanzees which I have met or used in experi-

ments," he said, "I have seen not one with a malignant growth, and none insane. Why this signal difference between them and us in the incidence of such dread diseases? Have they immunity, or a better way of life than ours?"

Chimpanzees, which look like a caricature of man, actually are strikingly like man in both bodily functions and behavior, Dr. Yerkes said. They are subject to most human diseases. For that reason they are important as laboratory animals for medical research. According to modern medical opinion, the chimpanzee is the only animal known to be susceptible to the common cold.

But the value, however great, of the chimpanzee for medical research is out-ranked, Dr. Yerkes indicated, by his usefulness for psycho-biological research.

"I have especially in mind studies, of which many are in progress, planned to extend and perfect our knowledge of normal human growth and development and our skills in the use of educational and other methods of guidance. . . .

"Chimpanzees happen to be almost ideal subjects for experimental studies of behavior and of the conditions which affect it; for inquiry into the role of heredity versus that of environment and education; for studies of learning or ability to profit by experience; of social relations and intimations of culture. . . .

"Already studies of anthropoid apes



"MAIN" STREET—Seabees lay down steel mats which are later filled with coral rock to make a smooth surface for the main street at a Southwest Pacific Navy base. In the background are the Seabee tents hidden from sight of enemy planes by towering coconut palms.

and other experimental animals have gone far towards shattering the prevalent assumption or supposition that human nature can not or should not be changed or improved."

MEDICINE

Leukemia Case Puzzling

Marked improvement in three-year-old girl with acute lymphocytic leukemia baffles physician. Gasoline inhalations not believed responsible.

► THE "QUITE marked improvement" in three-year-old Diana Peel of Waterloo, Iowa, who has been suffering from leukemia has baffled her physician, Dr. Frank T. Hartman.

He cannot find any scientific explanation for it and has taken a "fingers crossed, rap on wood" view of the case, he stated in response to a query.

Diana has acute lymphocytic leukemia, a disease of the blood-forming organs which medical records show has always been fatal. The diagnosis, based on clinical symptoms and blood findings, was verified by Dr. Samuel Amberg, child specialist at the Mayo Clinic.

Diana at no time was given blood transfusions, X-ray treatment or any kind of treatment because the case was considered hopeless from the start.

The only treatment, if it can be called that, which Diana has had has been a strange sort of home remedy, inhalation of gasoline fumes. "It probably does not

Dr. Yerkes spoke during the intermission of a New York Philharmonic-Symphony broadcast over CBS sponsored by the United States Rubber Company.

Science News Letter, June 30, 1945

have a thing to do with the quite marked improvement in this child's condition," Dr. Hartman states, prefacing his account with "You may take it for what it is worth."

Here is what happened: While Diana was most seriously ill she was taken for a drive. Her family discovered when purchasing gasoline that she developed a desire, almost a mania, to inhale gasoline fumes. This the family allowed her to do, on repeated occasions each day, from a cloth saturated with gasoline.

"So many things are happening in medicine that are not altogether scientific that it might be possible this is one of those happenings," Dr. Hartman says. "Animals live by instinct and their sense of smell. Maybe babies and other human beings live in part the same way. Let us hope so in this case. Better keep our fingers crossed," he adds, "and rap on wood."

Science News Letter, June 30, 1945

CHEMISTRY

Raw Milk Detected

► A PRACTICAL method for readily determining whether the milk used in making Cheddar cheese was pasteurized has been developed by dairy experts of the U. S. Department of Agriculture. The addition of as little as 0.1% of raw milk to properly pasteurized milk, or a decrease of two degrees in the pasteurizing temperature for 30 minutes, can be detected by this new, improved test, a modification on the phosphatase test commonly used in testing milk for adequate pasteurization.

Although laws in various parts of the United States restrict the sale of raw milk for drinking, only a few states such as California, Illinois, Indiana and New York require that all cheese sold be made wholly from pasteurized milk, or that the cheese be cured for a definite period of time prior to its sale. Outbreaks of

various diseases such as typhoid fever and undulant fever have been attributed to the consumption of cheese made from unpasteurized milk and cured for only short periods of time.

The new method for detecting the use of unpasteurized milk products in cheese was developed by Dr. George Sanders and Oscar S. Sager of the Bureau of Dairy Industry, and is based on the fact that the enzyme phosphatase, present in raw milk, is destroyed when milk is satisfactorily pasteurized.

In the test disodium phenyl phosphate is added to the cheese to be tested. If any phosphatase is present, it splits this organic phosphate, liberating phenol in proportion to the amount of phosphatase activity present. A reagent is added which, reacting with the phenol, develops a rich blue indophenol color. A scale

of standard colors, prepared with known amounts of phenol, is used to measure the amount of phenol liberated, and thus the test shows the amount of unpasteurized milk product present or the extent of underpasteurization of the milk used.

More than 340 samples of Cheddar cheese, for which records of the treatment given the milk were available, were tested by this method. All samples of cheese made from raw milk or underpasteurized milk were detected, regardless of the age of the cheese.

Dr. Sanders presented this method for detecting unpasteurized or underpasteurized milk-cheese at the meeting of the committee on Standard Methods for Examining Dairy Products, American Public Health Association, in New York City.

Science News Letter, June 30, 1945

AERONAUTICS

Airmail Delivery by Parachute Is Probability

► AIRMAIL delivery by parachute to thousands of small towns in the United States is a probability of the near future. Tests made at the National Airport in Washington demonstrate that it can be successfully carried out, using a special conveyor to eject the mailbag and a special parachute to land it safely on the ground. The demonstration was by the Pennsylvania-Central Airlines and the Switlik Parachute Company.

The airline company perfected the method by which mail sacks, equipped with parachutes, can be efficiently and accurately dropped from low-flying transport planes. In the demonstration a plane flew at 130 miles an hour about 200 feet over the airport and ejected groups of sacks and parcels through a rear door by means of a conveyor designed by company engineers. Opened by a static line, the parachutes fell free for a few feet, billowed and dropped slowly, all landing within a short distance of each other.

Each parachute is packed in its own canvas bag, with the open-end-flap closed by snap-button fasteners. The parachute sack is attached to and remains with the mail bag during its descent. The mail bags are ejected from the conveyor and the plane when the pilot trips a trigger. A static line, with one end attached to the plane and the other end to the apex of the parachute canopy, withdraws the canopy as the load falls away. The line breaks, the canopy inflates, and the cargo descends slowly to the ground.

Science News Letter, June 30, 1945

ASTRONOMY

July Brings Eclipse

The first total eclipse of the sun visible in the U. S. and Canada since 1932 and the last until 1954 is the chief astronomical event of July.

By JAMES STOKLEY

► THE FIRST total eclipse of the sun visible in the United States and Canada since August, 1932, and the last until 1954, is the chief astronomical event of July. It occurs on July 9. Only along a narrow path beginning in Idaho, crossing Montana, Saskatchewan, Manitoba, Hudson Bay, Greenland, Norway, Sweden, Finland and Russia, will the moon be seen to cover completely the disk of the sun. But throughout practically the whole of North America and Europe there will be a partial eclipse, with more of the sun being hidden the nearer one is to the path of totality.

In New York City the moon will begin to encroach on the solar disk at 7:07 a.m. E.W.T.; the eclipse will be at its maximum at 8:03, with 57% of the sun's diameter covered, and the moon will move completely off the sun at 9:04. Atlanta, Ga., will see only 52% of the solar diameter hidden, at 7:51 a.m. There the eclipse will start at 7:01 and end at 8:46. Chicagoans will be able to watch the eclipse from 6:08 a.m. to 8:02 a.m., C.W.T., with the maximum, 73%, at 7:02 a.m. At Denver the eclipse will start before sunrise; the maximum, 84%, will occur at 6:03 a.m., M.W.T., and the end at 6:58 a.m. In southern California even the middle of the eclipse will occur before sunrise. In the vicinity of Los Angeles the sun will rise with 16% of its diameter covered, and the end will come soon after, at 4:55 a.m., P.W.T.

Usual Summer Display

As for the evening sky in July, we then will see the usual summer display of stars, and one planet—Jupiter—low in the northwest in the constellation of Leo, the lion, as indicated on the accompanying maps. These show the appearance of the heavens at 11:00 p.m., your own kind of war time, July 1, and 10:00 p.m. in the middle of the month.

It is to the south, however, that we find the most characteristic of the summer constellations, Scorpius, the scorpion, with the ruddy star Antares. To the right of Scorpius is a fainter group, Libra, the scales, and to their right is

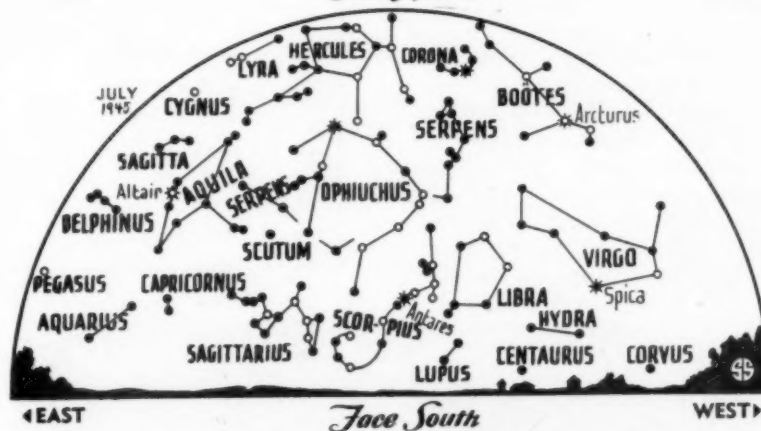
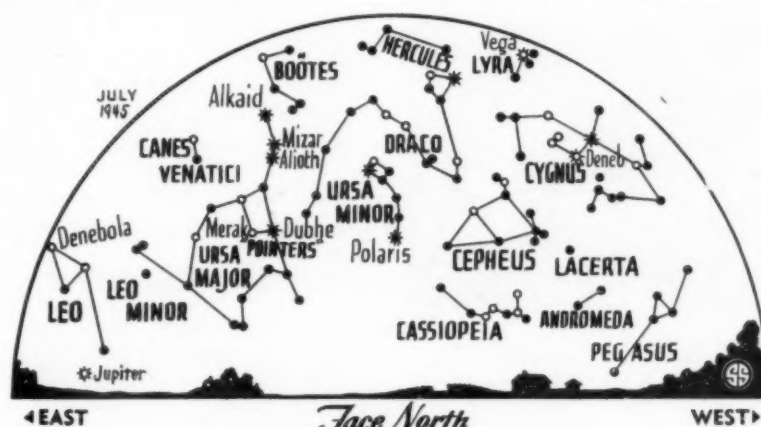
Virgo, the Virgin, with first magnitude Spica. Above Virgo is Bootes, the bear-driver, with brilliant Arcturus. This is in the west, and in the opposite direction, high in the eastern sky, is another brilliant orb, Vega, in Lyra, the lyre. Two bright stars can be seen below Vega. The one to the right is Altair, in Aquila, the eagle, and to the left stands Deneb, in Cygnus, the swan.

Two other planets are visible later in the night. Both Venus and Mars are in the constellation of Taurus, the bull, which comes up in July just before the sun, so in the early morning these two can be seen to the east. Venus, the brighter, is a little lower than Mars. Saturn is in line with the sun July 6, and invisible, but at the end of the month it will rise about two hours before sunrise. Mercury, innermost of the planets,

will be in the evening sky around July 23, but it sets so soon after the sun that it will hardly be visible.

Were this not wartime, the total eclipse on July 9 would doubtless be far better observed in this country than it actually will be. Although in the past astronomers from the U. S. Naval Observatory have traveled halfway around the world to observe an eclipse, they have no official expedition this year, as the Navy is busy with other matters. Probably some of the most extensive observations this year will be made in Russia where, long before the collapse of Germany, an elaborate eclipse program was being planned. Another eclipse in Russia a few years ago was observed extensively, even though this was during the dark days of the siege of Stalingrad.

If one could get there, and if the weather conditions were satisfactory, Greenland would be the best place to see the eclipse on July 9. There the eclipse occurs at noon, with the sun at its highest for the day; and the sun is hidden for a minute and 15 seconds.



*** SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

Do You Know?

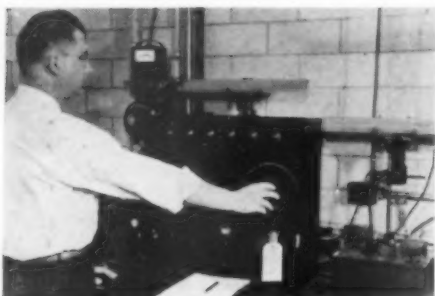
Farm tractor tires, inflated 100% with a calcium chloride solution, remain inflated in use or in storage, and have longer service-life because of minimum slippage and constant correct pressure.

Investigations made by government scientists lead to the prediction that the Alaska salmon pack for 1945 will be somewhat larger than in 1944 but still about 15% below normal.

Fontana lake in western North Carolina, which will result from the new Fontana dam, will have a 215-mile shore line; the dam is 450 feet high, the fourth highest in the world.

Chemically about 50% of the wood of white pine is cellulose, 25% lignin, and the rest sugars, resin wax, acetic acid and pentosan; all of these have valuable industrial uses.

The dormouse usually hibernates for six months, and a sudden coercive waking may be fatal.



"Esso" Tests Insulating Oils With L&N Schering Bridge

In making oil for electrical insulation purposes, many oil companies now check its properties with an L&N Schering Bridge, like the one shown here in use by Standard Oil Development Co., Esso Labs Research Div. This instrument provides the full accuracy of the original Schering idea, and can be operated more rapidly and in complete safety. Details are given in Catalog E-54(2), sent on request.

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Jrl Ad EN(11b)

At Rybinsk, in Russia, the eclipse lasts only 50 seconds, and occurs late in the afternoon.

In the United States and Canada, on the other hand, the eclipse occurs early in the morning. At Pine River, Manitoba, which is the most eastern point that can be reached directly by rail, the total eclipse occurs at 7:16 M.W.T., with the sun only 13 degrees above the horizon and a duration of 36 seconds. Butte, Mont., is in the path of totality. In the center of the path, a little south of the city, the sun is hidden for 25 seconds, when it is about 3 degrees above the horizon. Three degrees is about six times the sun's apparent diameter. Thus, if a person in this region wants to see it he will have to go to a place where there is a clear eastern horizon, otherwise buildings or hills might hide the sun. However, even though it is so early in the morning, chances for clear weather are fairly good.

As the moon covers the disk of the sun, there flashes into view the solar corona, its outermost region. Until a few years ago this could be seen only at eclipse time. Now astronomers have developed special instruments which enable them to study its brightest parts on other occasions, but only at an eclipse can the fainter extensions of the corona be observed. Thus, many of the observations that will be made by small astronomical groups will be concerned with this feature. Others may study the spectrum of the corona, or the spectrum of the last bit of the sun that remains visible an instant before totality and, of the first, which appears a moment after it is over.

Still other observations will be con-

cerned with the brightness of the sky while the eclipse is at its height. Although a few bright stars and planets appear when the sun is hidden, it will probably get no darker than a medium twilight. The reason for this is that the air outside the shadow of the moon scatters considerable light into the shadow.

But aside from its scientific value, an eclipse of the sun is the most impressive of all natural phenomena. After this year the next total eclipse visible in the United States and Canada will come on June 30, 1954, when the path crosses Nebraska, South Dakota, Wisconsin, Michigan, Ontario and northern Quebec. With travel restrictions what they are it will be difficult for sightseers to go to the eclipse this year, but anyone in the path of totality will certainly be repaid by getting up early to see this celestial show.

Celestial Time Table for July

July	EWI	
2	2:13 p.m.	Moon in last quarter
4	10:00 p.m.	Moon nearest, distance 228,900 miles
5	6:00 a.m.	Earth farthest from sun, 94,452,000 miles
9	9:35 a.m.	New moon; total eclipse of sun
11	6:17 a.m.	Moon passes Mercury
14	8:12 a.m.	Moon passes Jupiter
17	3:01 a.m.	Moon in first quarter
	8:00 a.m.	Moon farthest, distance 251,200 miles
23	4:00 p.m.	Mercury farthest east of sun
24	10:25 p.m.	Full moon
28		Meteors of delta Aquarid shower
30	2:00 a.m.	Moon nearest, 229,300 miles
31	6:30 p.m.	Moon in last quarter

Subtract one hour for CWT, two hours for MWT, and three for PWT.

Science News Letter, June 30, 1945

An odorless fly spray, that will not irritate the skin or nose of the user, has been developed by U. S. Department of Agriculture chemists.

ERRATA, Vol. 47, Nos. 1-26, January-June, 1945

PAGE	TITLE BEGINS	CORRECTIONS
19	Productivity Increased	Experiments were by Prof. Victorov instead of Peterburgsky.
21	Vegetables	Par. 4, line 5, after ponics, delete rest of paragraph.
24	Ancient Maori God	See SNL March 24, 1945, p. 181.
79	Books	Par. 2, line 4, Dickinson for Dicinksen.
92	Do You Know	Par. 9, line 4, bearded for bearded.
126	Weapons	Col. 2, line 12, delete Congressional; line 13, delete and Development.
153	Simple Chemical	Line 3, aid for replace.
185	Earthworms	Phenomenon not new.
195	8,000 Pictures	Col. 2, line 6, millionth for thousandth.
229	Chile	Line 9, Arica for Africa.
234	Plant	Tomato mentioned is Pan-America, not Pan-American.
249	Nine Out of Ten	Par. 4, line 6, after 1915, insert as shown in reports from the Birth Registration States.
276	National Academy	Col. 1, line 7, Dr. Hibbert is a chemist, not a biologist.
321	Cover caption	Supersonic Speeds for Supersonics.
328	Cancer	Line 2, Prostate for Prostrate
328	Astronomy Offers	Col. 2, line 5, delete the oscillations of.
329	Study of	Line 10, Washington University for the University of California.
343	Physics Laboratory	Last par., line 3, respiration and function of capillaries for vitamins.
346	Blood	Col. 3, line 7, to read, child having one parent with only Rh positive inheritance and.

PYROTECHNICS

War's Fireworks

Brighter skies are predicted for future Fourth-of-July displays. Can-like "candles" emit great clouds of smoke in six assorted colors.

By FRANK THONE

See Front Cover

► **FOURTH-OF-JULY** celebrations have always meant the noisy and spectacular burning of a lot of gunpowder. We seem to get a more satisfactory feeling of independence and national power if we devote one day in the peaceful year to making noises and flashes and smoke-clouds like those of war. Even in those parts of the country where of recent years the idea of a "safe-and-sane" Fourth has come to prevail, the younger generation has usually had to be appeased by being taken to see a big public fireworks display in the evening.

Because we do celebrate by reproducing, as well as we are able, the lightnings and thunders of battle, it is more or less inevitable that our fireworks shall be influenced by our weapons. Our earliest Independence Day celebrations consisted mainly in banging away all day long with blank charges from the old Revolutionary War cannon parked on the village green. Or, if the village could not boast such a heroic relic, there were always plenty of flintlock muskets and horse-pistols that would make acceptably noisy substitutes.

The showier night fireworks, that came along a little later, had their military counterparts also, in the rockets and flares used for signalling on the battlefield and from ships. Rockets, apparently, were weapons of deadly combat even before they became signal lights and means of patriotic entertainment. "The rockets' red glare," immortalized by Francis Scott Key, came from iron-cased projectiles carrying bursting charges of gunpowder, that were the ancestors of the present war's multiform rocket artillery.

Effects of War

If earlier wars thus influenced the evolution of fireworks, it is only reasonable to expect future Fourth of July to show the effects of this one, with its unprecedented rate of invention and application of new devices and techniques.

Rockets, already mentioned, are not at

all a new weapon; their smoky trail goes back into medieval Europe and beyond that into ancient China. But present-day methods for launching them in massive volleys or rapid fusillades have made them virtually a new means of warfare, and the same multiple launchers and electric firing can be adapted to professional-scale pyrotechnic displays, with spectacularly brilliant results.

What we have learned about more efficient and accurate rocket propulsion in war may also be applied with profit to the less deadly fireworks of peacetime, even for individual front-lawn celebrations. The traditional but clumsy paper-and-stick construction may soon give way to more compact types, cased in light metal or perhaps in plastic, with launching-tubes to insure that they will start their flight properly, and not end it ignominiously (and dangerously) on a neighbor's roof. It is even possible that the "spinner" type of rocket, found most accurate for military purposes, may replace the old familiar stick-guided type.

Flares and aerial bombs, old standbys of professional pyrotechnics though less used in private celebrations, may take

a leaf from the soldier's manual, too. Hitherto they have been fired from what amount to one-use mortars, made of laminated cardboard. Fighting forces, however, have found that their adaptations for night signalling and illumination can be very advantageously discharged from the same type of mortars that throw high-explosive, incendiary and chemical shells.

Very high rates of fire can be maintained by simply dropping the projectiles one after the other into the up-turned muzzle. Pyrotechnicians may find it to their advantage to buy up some leftover 60-millimeter mortars after the war, or even to develop some specially adapted mortars of their own.

Some particularly gorgeous pyrotechnic effects can be obtained with white phosphorus, which has been much used in the present war as an incendiary. However, this military value of phosphorus will probably tend to discourage its use for display purposes—just too much chance of setting fire to things. The dense white smoke given off by burning phosphorus, another of its military advantages, becomes a handicap to its use for Fourth-of-July purposes.

Tracer ammunition is another kind of warlike fireworks that is regrettably unsuitable for peacetime displays. Tracer bullets, like those shown on the front

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cover of this SCIENCE NEWS LETTER, from either airplane or ground guns, writing their dotted lines of fire across the night, never fail to bring admiring "Oh's" and "Ah's" from civilians who see the show.

But unfortunately they are still bullets, capable of killing at long ranges. So unless there is an unlimited stretch of empty ocean, swamp or desert available this type of fireworks is not likely to outlive the war.

Colored Smoke

One of the really new inventions of World War II that is practically certain to win favor as day fireworks is colored smoke. Can-like "candles" that emit great clouds of smoke in six assorted bright rainbow hues have had extensive use in both land and sea fighting as signals and means of identification. Their effect is absolutely beautiful, especially under bright sunlight. They can supply something of the brilliance of night fireworks to daytime celebrations.

As used in the war, these colored smokes have always been set off on the ground. However, there is no reason for such limitation. Gorgeous effects might be obtained by firing them upward from mortars, letting them trail pillars of bright cloud behind them; or dropping them from airplanes, like showers of variegated daytime comets. Or they might be attached to the plane itself, while the pilot does a little stunting. Imagine sky-writing in Technicolor!

Airplanes have been used in a rather limited way in the past, for displaying fireworks of various kinds. Now that there are hundreds of pilots who have become skilled in the launching of high-explosive rockets under the toughest of combat conditions, we can surely expect some of them to be ready to lend their ability, in postwar Fourth-of-July celebrations, to making the night skies bright with brighter missiles that will be the symbols of victory and peace.

Science News Letter, June 30, 1945

ETHER AND MATTER

by C. F. Krafft (1945 edition)

CONTENTS: The Hypothesis of a Hydromechanical Ether—Classical versus Einsteinian Relativity—The Red Shift—Gravitation—The Constitution of the Sun and Stars—Electromagnetism—Theories of Atomic Structure—Introduction to the Vortex Atom—Vortex Atom Structures—The Heavier Elements—Living Matter.

The price is one dollar, but a copy will be sent free to any school, college, or public library.

C. F. KRAFFT

1322 Amherst Ave. Richmond 22, Va.



National Emblems

► **FOURTH-OF-JULY** orators don't "scream the eagle" as they used to; oratory of that kind has largely passed out of fashion—except occasionally in Congress. But the eagle does figure prominently in patriotic cartoons about this time of year, and we still do feel a thrill of admiration for that magnificent bird—even though we have all but exterminated it in most parts of the country where it used to be abundant.

It is appropriate that by general consent the eagle, legislated as part of our national Great Seal and as a device on most of our coins, should be the white-headed, or bald, eagle, though it was not so specified at the time. The other eagle seen occasionally on this continent, the slightly larger golden eagle, occurs in Europe and Asia as well, and has figured in imperialistic heraldry all the way from Assyria and Rome down to Napoleonic France and Czarist Russia; so we prefer to have none of it.

Only one other claimant for honors as the national bird has ever been put forth: the wild turkey. Benjamin Franklin offered good arguments for the turkey against the bald eagle, and the great naturalist Audubon backed him up. But nothing ever came of it.

If we should ever wish to have a four-footed animal emblem, the vote would probably go heavily in favor of the bison, or American buffalo. This impressive animal figures on the seal of the Department of the Interior, and was familiar for about a generation on the "buffalo nickel", only now being retired from circulation.

No national flower has ever been chosen for this country. Support seems fairly evenly divided between two: goldenrod and columbine. Goldenrod, being a composite flower, teaches the



V-E DAY—The boys of the Twelfth Air Force B-25 group celebrated by firing a lot of signal flares into the air with a most brilliant Fourth-of-July effect.

lesson, "*E Pluribus Unum*." It suffers, however, from the almost wholly baseless accusation of being a hayfever weed. The columbine seems to enshrine the name of Columbus; though actually the name of the great discoverer and the name of the flower go back to a common source, the Latin word for dove. By a curious irony, the botanical name of the columbine, *Aquilegia*, is said (though somewhat doubtfully) to be derived from the Latin name for an eagle.

Neither is there an officially adopted or popularly accepted American tree. A likely candidate would seem to be the American elm. It was under a giant of this species that Washington accepted his commission as General of the Continental Army, and other great elms have figured in more than one episode



WYOMING

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in the history of our country. If only we can save our elms from the menace of an insidious alien enemy that attacks from within, the elm disease, it might be appropriate to celebrate the victory

of science in this battle by appropriate legislative and educational action, to make this tree mean as much to us as the oak does to England.

Science News Letter, June 30, 1945

Books of the Week

AIRPLANE CRASH FIRE FIGHTING MANUAL—*National Fire Protection Association*, 96 p., illus., \$1.

A. S. T. M. STANDARDS ON CEMENT, with RELATED INFORMATION—A. S. T. M. Committee C-1 on Cement—*Amer. Soc. for Testing Materials*, 169 p., paper, \$1.50. Specifications, methods of chemical analysis, and physical tests are included.

THE DISTRIBUTION OF THUNDERSTORMS AND THE FREQUENCY OF LIGHTNING FLASHES—R. Ruedy—*National Research Council of Canada*, 75 p., paper, illus., \$1. Second edition, revised and enlarged.

THE HISTORY OF SURGICAL ANESTHESIA—Thomas E. Keys—*Schuman's*, 191 p., illus., \$6. An introductory essay by Chauncey D. Leake, and a concluding chapter, the Future of Anaesthesia by Noel A. Gillespie.

HOW TO KNOW MOSSES—Henry S. Conard—*Wm. C. Brown*, 166 p., illus., \$2.50. Pictured-keys for determining many of the North American mosses and liverworts, with suggestions and aids for their study.

THE MARINE ANNELIDS OF NORTH CAROLINA—Olga Hartman—*Duke Univ. Press*, 53 p., paper, illus., \$1.

MEN UNDER STRESS—Roy R. Grinker and

John P. Spiegel—*Blakiston*, 484 p., \$4. Emotional effect of combat on our Air Forces.

RUSSIANS SAY IT THIS WAY—Dolly Gurvitch and A. Herenroth—*Int. Univ. Press*, 63 p., paper, illus., \$1.50. Ninety-nine Russian idiomatic expressions and their American equivalents.

TOTAL WAR AND THE HUMAN MIND—A. M. Meerloo—*Int. Univ. Press*, 78 p., \$1.75. A psychologist's experiences in occupied Holland.

UNITED STATES GOVERNMENT MANUAL, 1945—Office of War Information, Div. of Public Inquiries—*Supt. of Doc.*, 714 p., paper, \$1. Revisions through March 10.

THE USEFUL SOYBEAN, A Plus Factor in Modern Living—Mildred Lager—*McGraw*, 295 p., illus., \$2.75. A cookbook that tells the story of the soybean as well as giving recipes.

Science News Letter, June 30, 1945

Sodium metasilicate is an effective compound to clean glassware and make it brilliant and sparkling; it is the basic material in certain commercial products for cleaning glass.

VETERINARY MEDICINE

Rabbit-Killing Disease To Be Investigated

► RABBIT-RAISING, looked to hopefully by many persons as one ready means for relieving the meat shortage, is beset with its own difficulties, one of the most troublesome of which is a killing disease known to professional rabbit-raisers as "bloat", to veterinarians as enteritis. The cause is still unknown, all attempts to reproduce it experimentally have failed, and there is no known cure.

To deal with this profit-destroying situation, the Fish and Wildlife Service, U. S. Department of the Interior, has undertaken a research campaign which will be carried on at a special experiment station at Fontana, Calif., under the direction of Dr. Everett E. Lund. He will also study other rabbit troubles, especially lung and skin diseases.

Dr. Lund has already had considerable experience with rabbits. While a member of the biology faculty at Alfred University, Alfred, N. Y., from 1937 to 1944, he raised them on a semi-commercial basis, partly for classroom use and partly for sale.

Science News Letter, June 30, 1945

In the Physiologic Synthesis of Biocatalytic Substances

That protein may well be called the mother-substance of life, gains substantiation from its dual role in all organic economy: it is the primary constituent of all protoplasm, and also the essential "raw-material" and component of many biocatalytic substances concerned with vital metabolic functions.

Secretin, for instance, a polydynamic substance credited with enhancing the secretion of pancreatic juice, bile, and probably also of succus entericus, is proteinic in nature, a poly-

peptide. Yellow enzyme, an essential factor in cellular oxidation, results from a combination of protein with riboflavin and phosphoric acid.

For the proteins and their derivatives required for such synthesis, the organism finds only one source—the proteins contained in the foods eaten.

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☼ **BEACH DRESSING** tent, patented, is a one-pole circular affair with the human body for the pole; which enables the wearer to change clothes on the beach with operations concealed. It fits about the neck, is held wide over the shoulders with a wire loop, and then droops to the ground.

Science News Letter, June 30, 1945

☼ **PRESSURE GAUGE** for diesel engines gives instantaneous reading of peak firing pressure and compression pressure. When the indicator stop is opened, admitting the pressure to the gauge, its pointer gives the proper reading and remains fixed until a release screw is turned.

Science News Letter, June 30, 1945

☼ **COCKROACH TRAP**, an inexpensive device, is made from a single sheet of material, stamped out and folded to form a box with square base and two triangular sides with flanges through which the insects enter. Food bait attracts them to a hinged shelf from which they are dumped automatically into a jar.

Science News Letter, June 30, 1945

☼ **DUST COLLECTOR** in the picture is a portable and self-contained unit that efficiently removes from the air, in factories and other establishments, all kinds of dangerous and obnoxious dusts. No collector bags are used. Tubular filter



surfaces drop the dusts into a pan in the bottom of the unit.

Science News Letter, June 30, 1945

☼ **CORD REEL** for the electric cable on a vacuum cleaner is mounted on the under side of the handle with the dust bag especially fitted to cover it. The improved reel, of light-weight plastic, discharges the cable through the hollow handle of the cleaner.

Science News Letter, June 30, 1945

☼ **TOBACCO PIPE**, in which no moisture collects at the bottom of the bowl, has a vertical pencil-sized well inside the bowl extending from the top to the pipestem. The smoke is drawn from the burning area through a slot in the well instead of through the tobacco in the bottom of the bowl.

Science News Letter, June 30, 1945

☼ **STAPLE PULLER**, to remove ordinary wire staples used to hold papers together, is a tool resembling an ordinary letter opener. It has two parallel wedge pieces on the top side which are slid under the staple, raising it up while the flat lower side of the tool holds the paper from tearing.

Science News Letter, June 30, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 265.

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Question Box

AERONAUTICS

How may airmail to small towns be delivered in the future? p. 406.

ASTRONOMY

How should you protect your eyes while viewing the eclipse of July 9? p. 403.

On what planets may life exist? p. 402.

What is the major astronomical event of July? p. 407.

CHEMISTRY

How can it easily be determined if the milk used in making cheese was pasteurized? p. 406.

INVENTION

What new service is offered to inventors? p. 404.

MEDICINE

How do doctors explain the marked improvement in the child with leukemia? p. 406.

What has given rise to the hope that vaccination against dengue may be achieved? p. 403.

PSYCHOLOGY

For what kind of research are chimpanzees most valuable? p. 405.

PUBLIC HEALTH

What state reports the most polio cases? p. 404.

VETERINARY MEDICINE

How will the rabbit-killing disease "bloat" be investigated? p. 411.

ZOOLOGY-BOTANY

If we ever want a four-footed animal nation emblem, which animal would probably be chosen? p. 410.

Where published sources are used they are cited.

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